

Acute, Febrile CNS Illnesses in an Endemic Area of Texas

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ARBOVIRUS INFECTIONS have been endemic in Hale County, Tex., for at least 10 years, with high attack rates among humans occurring during 1963 and 1964 (1). Western equine encephalitis (WEE) virus has been the most frequent etiological agent in central nervous system (CNS) illnesses; however, St. Louis encephalitis (SLE) virus and enteroviruses have also accounted for a significant proportion of the reported cases in this county (1).

During the summer and fall of 1965, continuing studies in this area revealed that arbovirus activity was still high among birds and mosquitoes (primarily *Culex tarsalis*), but there was a significantly lower attack rate of febrile CNS disease among the human population.

It was suspected that part of the reason for the decrease in incidence of febrile CNS illness in 1965 might be related to the immune status

of the population. Therefore, a serologic survey was conducted in the fall of 1965 to determine antibody prevalences for WEE, SLE, and selected enteroviruses in the population, and to attempt to correlate these data with the epidemiologic findings of 1963-65. This paper describes the epidemiologic findings and the results of the serologic survey in Hale County during 1965.

Materials and Methods

The ecological and demographic characteristics of Hale County have been described previously (1); also, the methods of surveillance and study of suspected febrile CNS illnesses have been detailed (1). Briefly, all reported cases were studied by the investigators, and acute-stage and convalescent-stage serum specimens were obtained for serologic studies. In addition, throat swabs, stools (or rectal swabs), and cerebrospinal fluids were obtained whenever possible for virus isolation studies.

Criteria. The following criteria were used for the diagnosis of arbovirus infections.

1. Confirmed WEE or SLE cases: (a) four-fold rise or fall in hemagglutination inhibiting (HI) or complement fixing (CF) antibody titers between appropriately timed acute and convalescent serum specimens, or (b) HI titer of 1:160 or greater from a child less than 1 year of age, or (c) isolation of the virus from the patient.

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2. Presumptive WEE or SLE cases: HI titer of 1:160 or greater in a single serum specimen obtained not less than 7 days after the onset of illness in a patient more than 1 year of age.

3. Equivocal WEE or SLE cases: HI titers 1:40 or 1:80 without a fourfold change in titer of acute and convalescent titers.

All diagnoses of enterovirus infections were based on a fourfold or greater rise or fall in neutralizing antibody titers between paired serum specimens, one taken during the acute phase of illness and the other during convalescence.

Serologic survey. A serologic survey was conducted during the last week of October 1965. Printed forms explaining the nature of the survey and requesting permission to obtain serum samples were given to students in the public

schools, with instructions to take these to their parents and return them within 3 days. The school children as well as other members of the families were asked to participate in the study. In addition, newspaper and radio publicity was used to recruit other volunteers, particularly among the age groups under 4 years and over 40 years. A total of 403 healthy persons volunteered. Serum samples were obtained from these people and shipped immediately to the participating laboratories.

Neutralizing antibodies were determined for ECHO 9, ECHO 11, and Coxsackie B2, since these viruses were known to have been associated with febrile CNS illnesses in the county during 1964 and 1965. The serums were tested in serial twofold dilutions beginning at 1:8 and ending at 1:512, using a microtiter method (2). A

Figure 1. Reported suspect cases of febrile central nervous system illnesses by week of onset, Hale County, Tex., and surrounding areas, 1965

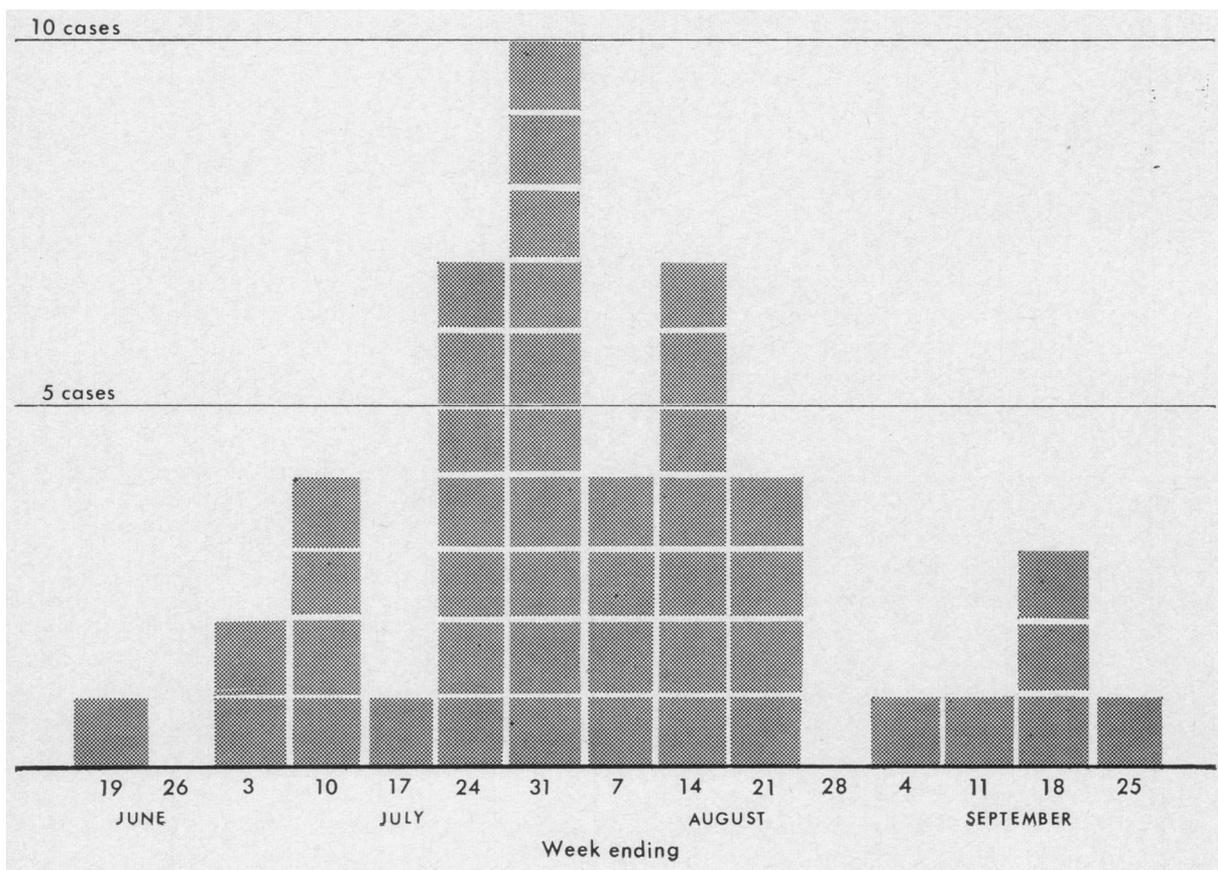
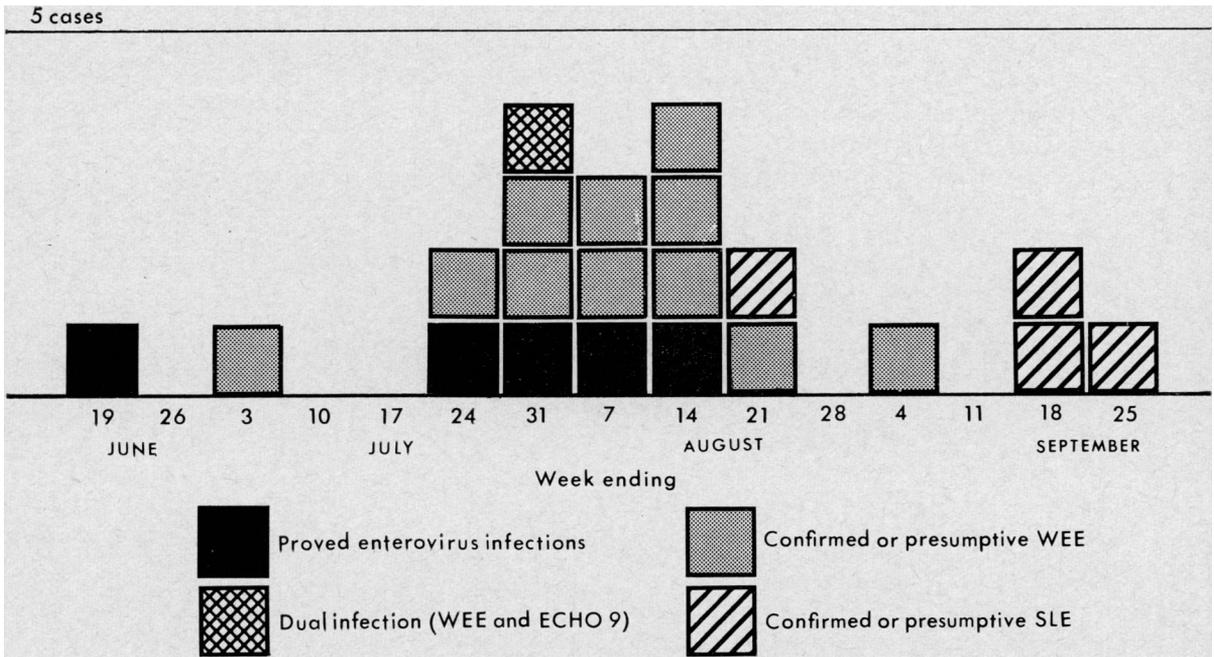


Figure 2. Etiological diagnoses for 21 patients by week of onset of febrile central nervous system illnesses, Hale County, Tex., and surrounding areas, 1965



serum was considered negative if it failed to neutralize 50 to 300 tissue culture doses of the test virus at the minimum dilution of 1:8.

Neutralization tests were used to determine antibodies to WEE and SLE viruses. The

Table 1. Etiological diagnoses of reported suspect cases of febrile central nervous system illness, Hale County, Tex., and surrounding areas, 1965

Etiological category	Number of patients	Percent
Western equine encephalitis ¹	11	24
St. Louis encephalitis ¹	4	9
ECHO 9.....	2	11
ECHO 5.....	1	
ECHO 9 and ECHO 5.....	1	
ECHO 19.....	1	
Dual infection ²	1	2
Equivocal WEE.....	2	4
Equivocal SLE.....	2	4
No diagnosis.....	21	46
Total.....	46	100

¹ Confirmed or presumptive cases.

² Antibody titers positive for WEE and ECHO 9.

neutralization indices were determined for WEE by the plaque reduction method in duck embryo tissue cultures (DETC), and SLE antibody determinations were done in mice. When questionable results were obtained in mice, the serums were retested for SLE antibodies by the plaque reduction method in DETC with added fresh serum factor.

In the plaque reduction tests, a serum was considered positive if it reduced the virus titer by 1.0 log or greater. Serum samples which reduced the virus titer by 1.7 logs or greater in the mouse protection test were considered to have significant antibodies to SLE.

Results

The 1965 outbreak. Forty-six suspect cases of febrile CNS disease were reported during the summer and fall of 1965; there were no deaths (in 1963 there were 77 suspect cases and in 1964 77 suspect cases). The epidemic histogram (fig. 1) shows onset of the first case in mid-June and peak occurrence during the last week of July. A second, smaller group of cases was reported dur-

ing September. Of the persons affected, 35 lived in the county and 11 who were from adjacent areas received their medical care in the county. The etiological diagnoses of their illnesses are shown in table 1. Eleven persons had WEE (either confirmed or presumptive) and four had SLE. Enteroviruses were associated with the illnesses of six persons. ECHO 9 was associated with four illnesses, including two instances of "dual" infection.

The patient with a dual enterovirus infection had a greater than fourfold rise in appropriately spaced acute and convalescent serums to both ECHO 9 and ECHO 5 viruses. However, ECHO 9 virus was isolated from throat and stool specimens during the acute illness, and it may have been the primary causative agent of this patient's illness. In the patient with evidence of concomitant ECHO 9 and WEE infections (based on greater than or equal to fourfold antibody rises), it was not possible to determine the principal agent causing the illness.

An etiological diagnosis was not possible for 21 patients reported as having suspect cases of febrile CNS disease, although they were tested serologically for antibodies to WEE, SLE, and the most prevalent enteroviruses of the past 2 years (ECHO 9, ECHO 11, Coxsackie B2, and ECHO 5).

Figure 2 shows the epidemic histogram for all

patients with established etiological diagnoses. Onset of the majority of the enterovirus and WEE infections occurred during July and August, while the SLE infections were more closely grouped in September at the end of the outbreak.

The age-specific attack rates of reported cases of febrile CNS disease and those which were subsequently proved to be WEE and enterovirus infections among residents of Hale County are shown in table 2. The highest attack rate for WEE was in children less than 1 year of age, while the rates for those with clinical enterovirus infections showed no specific age predominance. Except for the lower rates, the age distribution of the WEE patients was similar to that of the previous 2 years and the enterovirus and SLE distributions corresponded to those found in 1964 (1).

Clinically, three types of syndrome were seen among the reported illnesses.

1. Encephalitis, with fever and objective evidence of cerebral dysfunction on neurological examination; for example, disorders of mentation, convulsions, or motor deficits.
2. Aseptic meningitis with fever, nuchal rigidity, and headache, but no abnormal neurological findings.
3. An acute illness characterized by fever, nausea, vomiting, headache, myalgia, and mild

Table 2. Age-specific attack rates of febrile central nervous system illnesses among 35 residents of Hale County, Tex., 1965

Age group (years)	Population ¹	Total reported cases ²		Confirmed and presumptive WEE		Confirmed enteroviruses ³	
		Number	Rate per 100,000	Number	Rate per 100,000	Number	Rate per 100,000
Less than 1	989	5	506	3	303	0	-----
1-4	3,715	4	108	2	54	1	27
5-9	4,495	4	89	1	22	1	22
10-19	7,010	6	86	2	29	0	-----
20-29	4,798	7	146	1	21	1	21
30-39	4,546	5	110	0	-----	1	22
40-59	7,455	3	40	0	-----	0	-----
60 and over	3,790	1	26	0	-----	0	-----
Total	36,798	35	95	9	24	4	11

¹ 1960 U.S. Census.

² Includes all cases of febrile central nervous system illness reported in Hale County, whether or not etiological diagnosis was established.

³ Includes ECHO 9, ECHO 5, ECHO 19; one case of concomitant western equine encephalitis (WEE) and ECHO 9 infection is not included in this table.

Table 3. Distribution of 403 survey subjects by sex, race, place and duration of residence, and age, Hale County, Tex., 1965

Category	Number of subjects
Sex:	
Male.....	182
Female.....	221
Race:	
White.....	260
Latin American.....	114
Negro.....	15
Not stated.....	14
Residence:	
Urban.....	312
Rural.....	91
Duration of residence (years):	
Less than 1.....	38
1-2.....	69
3-5.....	63
6-10.....	88
11-20.....	100
More than 20.....	41
Not stated.....	4
Age group (years):	
0-4.....	30
5-9.....	82
10-19.....	122
20-29.....	36
30-39.....	43
40-49.....	45
50 and over.....	45

lethargy, but without significant nuchal rigidity or objective neurological abnormalities. Patients with this type of syndrome were designated as having undifferentiated febrile illnesses.

None of the patients demonstrated clinical findings suggestive of paralytic poliomyelitis.

Of the 46 patients, 15 had clinical findings of encephalitis; 6 of these were associated with WEE infections, 2 with SLE, and 7 remained undiagnosed. (The term "undiagnosed" includes patients with no diagnoses or equivocal SLE or WEE serology.) Aseptic meningitis syndromes were noted in 29 patients; 5 were associated with enterovirus infections, 5 with WEE, 1 with SLE, 2 with dual infections, and 16 were undiagnosed. Only two patients were classified as having undifferentiated febrile illnesses. One was associated with SLE infection, and no etiological diagnosis was established for the other.

Serologic survey. The distribution of the 403 survey donors according to sex, race, place and duration of residence, and age is shown in table 3. Of the 403 serum samples obtained, enterovirus neutralizing antibodies were determined

on 400, and arbovirus neutralizing antibodies were determined on 398.

Seven donors gave a history of clinically diagnosed encephalitis. Their ages ranged from 12 to 46 years, and none had been ill during the 1965 season. Four of these persons had no detectable arbovirus neutralizing antibodies, two had antibodies to both WEE and SLE, and one had antibodies to SLE only.

Enterovirus antibodies. The prevalence of enterovirus antibodies among the survey population (table 4) was 83 percent for ECHO 11 and 66 percent for Coxsackie B2; these agents had been associated with illness during the 1964 outbreak (1). Sixty-one percent of this population had antibodies to ECHO 9, which had accounted for several illnesses in 1965.

Figure 3 depicts the percentage distribution of enterovirus antibodies by age groups and antibody levels. The percentage of antibody-positive persons (titer $\geq 1:8$) was further subdivided to denote the proportion who had high titers ($\geq 1:32$). The patterns for ECHO 9 and ECHO 11 were similar, except for the age group 20-29; slightly more than half of these persons had antibody titers $\geq 1:32$ to ECHO 11. The age-specific disparity of low (1:8-1:16) and high ($\geq 1:32$) antibody titers to Coxsackie B2 is more notable; all children less than 4 years of age had high titers, and the ratio of high to low titers steadily decreased with advancing age.

The percentage of children with antibodies for all three agents rose rapidly during the first 10 years of life; however, the percentage of chil-

Table 4. Prevalence of neutralizing antibodies to selected enteroviruses and arboviruses among survey subjects, Hale County, Tex., 1965

Agent	Number of serums tested	Number with antibodies	Percent with antibodies
Enteroviruses:			
ECHO 9.....	400	246	61
ECHO 11.....	400	330	83
Coxsackie B2.....	400	262	66
Arboviruses:			
Western encephalitis.....	398	109	27
St. Louis encephalitis.....	396	70	18

dren with ECHO 11 antibodies was remarkably high even among children less than 4 years of age (64 percent).

No significant differences in enterovirus antibody prevalence were noted with regard to duration of residence or place of residence. The prevalence of enterovirus antibodies is shown by sex and race in table 5.

The percentages of females with antibodies to ECHO 9, ECHO 11, and Coxsackie B2 were slightly higher than those of males; however, the differences were not statistically significant. The racial differences, however, are more marked. Almost three-fourths of the Negroes and Latin Americans had detectable antibodies to ECHO 9, while only 54 percent of white persons had antibodies to this virus. Although the percentage of Negroes with antibodies to ECHO 11 was lower than that of whites and Latin Americans, the small number of Negroes in the study makes interpretation difficult. There was no significant difference in the frequency distribution of antibody to Coxsackie B2 among the three racial groups.

Arbovirus antibodies. Serum samples from 398 healthy donors were tested for antibodies to WEE, and 396 were tested for antibodies to SLE. Neutralizing antibodies to WEE were detected in 27 percent, and SLE antibodies were found in 18 percent of the serums (table 4).

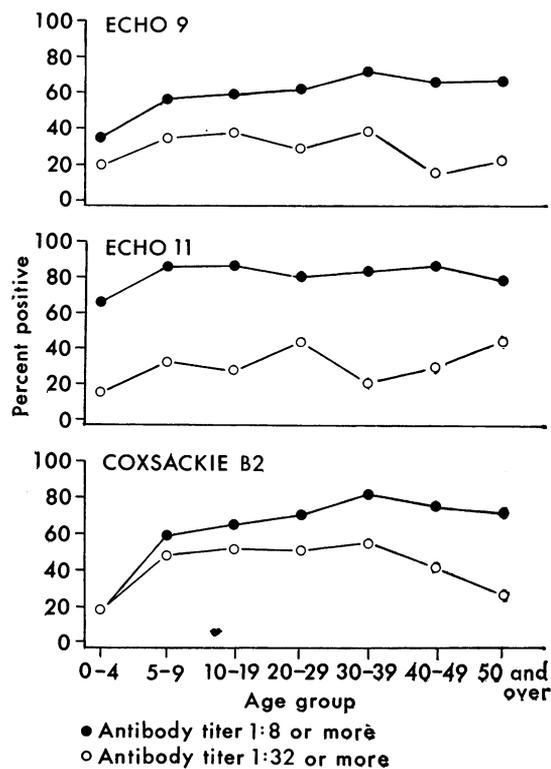
Table 6 shows the distribution of WEE and SLE antibodies by age and duration of residence of the study donors. WEE antibody was

Table 5. Distribution of enterovirus neutralizing antibodies by sex and race, Hale County, Tex., October 1965

Category	Number of persons tested	Percent positive		
		ECHO 9	ECHO 11	Coxsackie B2
Sex:				
Male-----	180	57	80	61
Female-----	220	65	84	69
Race: ¹				
White-----	258	54	81	68
Latin American-----	113	75	89	59
Negro-----	15	73	66	60

¹ Race of 14 subjects not known.

Figure 3. Distribution of enterovirus neutralizing antibodies among 400 serum donors, by age groups, Hale County, Tex., 1965



infrequent in the age group 0-4 years, but its frequency rose sharply to levels of 30 and 46 percent in the two school-age groups. In donors over 19 years of age, antibody prevalences ranged between 11 and 24 percent. Duration of residence appeared to be important in WEE antibody prevalence. Except for those aged 5-9 years, the prevalence of antibodies among persons who had lived in the county for more than 5 years was higher than among those who had lived there for a shorter duration.

A somewhat different age-specific pattern was noted with respect to SLE antibodies (table 6). Antibodies were infrequent in children under 10 years of age, but the levels varied from 18 to 28 percent among the older age groups. The relationship of duration of residence to SLE antibody prevalence among persons of different age groups showed a trend similar to that of WEE antibodies.

The relationships of sex, race, and place of residence to prevalence of WEE and SLE anti-

bodies are shown in table 7. A slightly higher percentage of males than females had antibodies to both agents, but the differences are not statistically significant. The major difference in race was related to WEE antibodies; Latin Americans had antibodies to WEE 1½ times as frequently as the white population. A slight difference was apparent between these two groups with respect to SLE antibodies.

The percentages of antibodies to WEE and SLE among rural dwellers were twice as high as among persons living in the urban areas.

Discussion

The cases of febrile CNS disease which occurred in Hale County annually from 1963 to 1965 exhibited similar epidemiologic patterns. The major difference observed in 1965 was that

Table 6. Distribution of western equine encephalitis (WEE) and St. Louis encephalitis (SLE) neutralizing antibodies, by age and duration of residence of study subjects, Hale County, Tex., 1965

Age group (years) and years of residence ¹	WEE			SLE		
	Number studied	Number positive	Percent positive	Number studied	Number positive	Percent positive
0-4:						
0-4.....	28	1	4	27	1	4
5-9:						
0-5.....	53	16	30	52	5	10
more than 5.....	29	9	31	29	1	3
10-19:						
0-5.....	33	9	27	33	6	18
more than 5.....	85	39	46	85	23	27
20-39:						
0-5.....	38	4	11	38	3	8
more than 5.....	39	10	26	39	11	28
40 or over:						
0-5.....	14	1	7	14	2	14
more than 5.....	75	18	24	75	16	21

¹ Four persons, for whom duration of residence was not known, were omitted from this analysis.

Table 7. Age-adjusted percentage distribution of western equine encephalitis (WEE) and St. Louis encephalitis (SLE) neutralizing antibodies by sex, race, and place of residence of survey subjects, Hale County, Tex., 1965

Category	WEE antibodies			SLE antibodies		
	Number tested	Number positive	Percent positive ¹	Number tested	Number positive	Percent positive ¹
Sex:						
Male.....	180	56	30	178	34	19
Female.....	218	53	25	218	36	17
Race: ²						
White.....	257	63	23	256	47	17
Latin American.....	112	45	35	111	20	22
Negro.....	17	1	3	15	0	0
Place of residence:						
Urban.....	309	69	21	308	47	15
Rural.....	89	40	42	88	23	30

¹ Age-adjusted.

² Race of 12 subjects was not known.

markedly fewer cases were reported than in the previous 2 years (1). Also, the peak of the 1965 outbreak occurred 2 weeks earlier than in 1963 and 3 weeks earlier than in 1964 (1). The age-specific attack rates did not change proportionately during the 3 years; infants remained at high risk for WEE infections throughout the period of observation.

As in the 1964 study (1), the clinical findings were not helpful in distinguishing between arbovirus and enterovirus infections; furthermore, etiological interpretation was made even more perplexing by the finding of two cases of dual infections. Dual infections are probably not uncommon, as Barrett and associates (3) found six children with evidence of concomitant SLE and enterovirus infections during the 1964 SLE outbreak in Houston.

The serologic survey indicated that a high proportion of the population possessed antibodies to ECHO 9, ECHO 11, and Coxsackie B2. The percentages of 61, 83, and 66 positive for these viruses respectively are comparable with those in the survey by Gelfand in southern Louisiana (4). He found antibodies to ECHO 9 in 55 percent and to Coxsackie B2 in 61 percent of the persons tested (4).

The analysis of age-specific antibody prevalence according to high ($\geq 1:32$) and low (1:8 to 1:16) titers indicates that Coxsackie B2 may have exhibited a periodicity in Hale County. On the other hand, the age-specific prevalences for ECHO 9 and ECHO 11 suggest that these agents have been endemic in Hale County for several years. However, the data do not permit definite conclusions regarding periodicity; continued surveillance and a repeat serologic survey after several more years would be necessary to clarify this point.

The proportion of persons with WEE antibodies (27 percent) in Hale County is higher than those reported from studies in two other endemic areas. Reeves and Hammon found that 7.6 to 8.4 percent of persons studied between 1946 and 1951 in Kern County, Calif., had neutralizing antibodies to WEE (5), and La Veck and associates found neutralizing antibodies in 10.9 percent of persons in Weld County, Colo. (6).

The WEE antibody prevalence in Hale County is similar to the 34 percent prevalence of

neutralizing antibodies found in Kern County, Calif., in 1960 (7) and the 29.3 percent found during 1944 in the Yakima Valley of Washington (8). In the Yakima Valley study, Hammon and Reeves noted very low antibody prevalences among the population during the epidemic years 1940-41; the high level occurred in 1944, a non-epidemic year. Their findings suggested that the absence of an outbreak during 1944 might have been partially related to a relative lack of susceptible persons in the population (8). Perhaps a similar mechanism was responsible for the significantly lower number of cases reported in Hale County during 1965.

High clinical attack rates among infants frequently occur in WEE outbreaks (1, 5). This is consistent with the age distribution of antibodies as shown in the Hale County study, in California (5), and in Colorado (6). These studies suggest that the age-specific attack rates observed for WEE are partly related to exposure and group immunity as well as to other factors, such as the known increased susceptibility among infants. Our data are also consistent with those of Reeves and Hammon who noted that WEE and SLE antibody prevalences rose with increasing duration of residence in an endemic area (5).

Summary

Investigations of the 1965 outbreak of febrile central nervous system disease in Hale County, Tex., an endemic area for western equine encephalitis (WEE), St. Louis encephalitis (SLE), and enterovirus infections, revealed that only 46 cases occurred in 1965. While the outbreak resembled those of the preceding 2 years, it was significantly less extensive. WEE infections were found to be responsible for 24 percent of the cases, SLE was associated with 9 percent, and enteroviruses were associated with 11 percent of the cases.

A study of 400 serum samples during October 1965 showed that 61 to 83 percent of the population studied had neutralizing antibodies to three enteroviruses which had been associated with illness during 1964 and 1965 (ECHO 9, ECHO 11, and Coxsackie B2).

Neutralizing antibodies to WEE were found in 27 percent and to SLE in 18 percent of

persons tested. The prevalence of age-specific antibodies for these agents correlated with the age-specific attack rates observed during the 3 years of study. The highest proportion of persons without WEE antibodies was in the age group 0-4 years. After 4 years of age, a rapid rise occurred in WEE antibody prevalence. On the other hand, the incidence of SLE antibodies was low among children under 10 years of age.

An analysis of arbovirus antibodies, according to race and place of residence, showed that WEE antibodies were significantly more prevalent among Latin Americans than other groups. Rural dwellers had a higher incidence of WEE and SLE than urban dwellers. No significant racial differences were noted with respect to SLE antibodies.

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Grant for Prototype Incinerator

The city and county of San Francisco, Calif., has received a \$117,193 Public Health Service grant to develop a solid wastes incinerator capable of meeting rigid air pollution restrictions with minimum control equipment. The grant covers two-thirds of the first year's cost of the project, which is expected to take 3 years to complete at a total cost of about \$760,000.

A prototype incinerator will be designed that burns 100 to 150 tons of solid wastes a day, but duplicates operating conditions in a full-size incinerator. The use of a new type of mechanical grate and the better use of air in the combustion chambers may result in more complete combustion and require only a minimum of cleaning and collection equipment for the control of stack emissions. Project engineers hope to save money in the construction, operation, and maintenance of the incinerator by eliminating some of the conventional control devices.

The scarcity of landfill sites in the San Francisco area and the need to abate contamination of the San Francisco Bay influenced the development of the incinerator. The new incinerator, if successful, is expected to benefit many U.S. cities which, lacking suitable landfill sites, must incinerate their solid wastes.

Program Notes

His First Cigarette

A pamphlet, "His First Cigarette May Be a Matter of Life or Death," is being distributed to parents of seventh and eighth grade students in public, private, and parochial schools of New York State.

The distribution is the first phase of a campaign against smoking sponsored by the Parent-Teacher Association with cooperation from the New York State Department of Health. New York is one of 21 States in which such programs to attack smoking, especially among teenagers, have begun.

Reduce Costs by Value Engineering

"Cost reduction through value engineering" is being tried for the first time by the Washington State Department of Health in cooperation with the Division of Hospitals and Medical Facilities of the Public Health Service. The new procedure is being included in the construction contract for Mason General Hospital at Shelton, Wash.

Under the procedure, the contractor on the job is encouraged to review the plans and specifications for a healthy facility in an attempt to spot cost savings which would result in equally satisfactory but more economical construction. If his suggestions are accepted, he then shares in the savings accrued by their adoption.

New York's Recruitmobile

The New York State Department of Mental Hygiene has been using a recruitmobile to seek additional mental health personnel. Representatives of the department and of the State's division of employment are on hand wherever the vehicle parks to explain the job opportunities in the State institutions.

For a 1-week period, the recruitmobile recently toured communities located near a State school and hospital at Sonyea. The aim of the tour was to fill vacancies at the school, including positions for nurses, attendants, and clerks. A new building and plans to institute the augmented type of care that it has made possible have increased the demand for personnel.

Chances of Death in Family

Chances of death in the U.S. family are dramatically lower today than they would have been 50 years ago. Nevertheless they are not negligible.

Today in families of three in which the husband is 20 years of age, chances of death of some members of the family within 5 years are 17 per 1,000 families. These chances are a sixth of what they would have been in 1909-11. There is a high probability, too, that the death will be of the young husband.—*Statistical Bulletin* (Metropolitan Life Insurance Company), April 1967.

Overdosing Infants With Aspirin

More than half of the accidental deaths from aspirin among preschool children are the result of overdosing.

When a child accidentally takes aspirin on his own, he is rushed to the hospital as soon as his mother finds the open medicine bottle and realizes that pills are missing. He is treated on an emergency basis and usually recovers without ill effects.

But when a youngster gets overdoses of aspirin as a treatment, the problem may go unsuspected until it is too late to save his life.

If a physician considers it necessary to prescribe aspirin for an infant or a toddler, an article in *Clinical Pediatrics* cautions, he should give the child no more than 1 grain

per year of age, 5 times a day. An infant should not be given aspirin for more than 3 days. He also should get liberal amounts of liquid during this period.—*Washington Post*, May 25, 1967

Helmets for Motorcyclists

Legislation to require motorcyclists to wear safety helmets has been enacted as of July 1967 in legislatures of almost half of the States.

In 1966, only Georgia, Michigan, and New York had enacted laws requiring motorcyclists to wear safety helmets. Through the first half of 1967, this number had increased to 23. Nineteen other States have similar legislation pending.

Helmets are the most effective devices available to reduce the severity of injury to motorcyclists, according to Dr. Richard E. Marland, chief of the Injury Control Program of the Public Health Service.

Motorcycle Accident Toll

Motorcycle accidents in the United States in 1965 took more than double the toll of lives that they had taken only 4 years earlier.

The number of drivers and passengers killed per 100,000 registered motorcycles was 2½ times the corresponding rate for all other types of motor vehicles in 1965. Nearly three-fourths of the accident victims were under 30 years of age.

Inexperience in motorcycle driving seems to have contributed to a great many of the accidents. Investigations in a few States have also appeared to implicate the lighter vehicles in more accidents. Drivers of the lighter vehicles are probably younger on the whole and less experienced than drivers of the heavier vehicles.—*Statistical Bulletin* (Metropolitan Life Insurance Company), April 1967.

Items for this page: Health departments, health agencies, and others are invited to share their program successes with others by contributing items for brief mention on this page. Flag them for "Program Notes" and address as indicated in masthead.